

**REMARKS**

Claims 1-3, 5-16, 18-20 and 22-26 are pending herein. By this Amendment, claims 4, 17 and 21 have been cancelled, claims 1, 2, 5-8, 12-16 and 18-20 have been amended, and new claims 24-26 have been added.

Claim 1 has been amended to include the contents of cancelled claim 4, and to limit the aromatic vinyl resin to polystyrene. Support for this latter amendment can be found, e.g., in cancelled claim 21. Claim 5 has been amended to depend upon claim 1 rather than claim 4. Claims 2, 6-8, 12-16 and 18-20 have been amended to overcome objections and a rejection under 35 U.S.C. § 112.

New claim 24 depends upon claim 1 and recites that the B block comprises dienes, polydienes and/or random copolymers of diene. Support for this claim can be found in the specification at, for example, page 5, line 35 through page 6, line 3.

New claim 25 depends upon claim 1 and recites that the B block comprises an alkyl (meth)acrylate. Support for this claim can be found in the specification at, e.g., page 6, lines 8-9.

New claim 26 is an independent claim combining the features of original claim 1 and amended claim 20.

In the Office Action, the Abstract and claims 2, 17, 18 and 20 are objected to; claims 1-22 are rejected under 35 U.S.C. § 112, second paragraph; claims 1-19 and 21-23 are rejected under 35 U.S.C. § 102(b) as being anticipated by Gottschalk et al. (“Gottschalk”); claims 1-23 are rejected under 35 U.S.C. § 102(b) as being anticipated by

Mehler, Kunststoffe, 88, 1872, 1874 and 1876 (“Mehler”); and claims 1-23 are rejected under 35 U.S.C. § 102(b) as being anticipated by DE 4240445 to Gottschalk (“DE ‘445”).

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the objections and rejections set forth in the Office Action.

### I. Objections

Applicants’ Abstract is objected to because it is not in the form of a single paragraph. Correction is required. Applicants have replaced the current “Abstract” and replaced it with a new “Abstract” attached hereto which is in the form of a single paragraph.

Claim 2 is objected to because of the two occurrences of the word “at”. Claim 2 has been amended to correct this typographical error.

Claims 17, 18 and 20 are objected to under 37 CFR § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. According to the Office Action, claim 17 refers to two different features in different claims, namely claims 1 and 16 and, therefore, claim 17 is improper. Furthermore, claim 16, from which claim 17 depends, contains all of the limitations of claim 1 and, therefore, according to the Office Action, the recitation that “the S and B blocks of the diblock S-B are those of claim 1” do not serve to further limit claim 16. According to the Office Action, claim 20 embraces materials which do not necessarily contain an S-B-M block

copolymer despite the fact that claim 1 requires such and, therefore, claim 20 is broader than claim 1 in certain aspects. Thus, claim 20 does not further limit claim 1.

By this Amendment, claim 17 has been cancelled and its rejection is now moot.

Claim 16 has been amended to delete the language "at least one block copolymer S-B-M".  
Claim 18 has been amended to depend upon claim 16 instead of cancelled claim 17. Claim 20 has been amended to delete the language "all or".

In view of the cancellation of claim 17 and the amendments to claims 16, 18 and 20, Applicants respectfully request withdrawal of the claim objections.

## **II. Rejection under 35 U.S.C. § 112**

Claims 1-22 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

According to the Office Action, the limitation that the glass transition temperature is less than the temperature for using the rigid material renders claim 1 unclear in that the temperature of using the rigid material is unclear and, therefore, the glass transition temperature is unclear. In addition, claim 1 is not drawn to a method of using a material and, therefore, this limitation makes no sense in the context of claim 1.

According to the Office Action, it is not clear what is intended in claim 2 by the recitation that the M blocks consist of syndiotactic PMMA "at least 60%" in that it is not required what is at least 60%.

Claim 2 has been amended to recite that the M blocks comprise at least 60% by mass of syndiotactic PMMA.

According to the Office Action, the term "dienes" in claim 7 lack antecedent basis in claim 4 (from which claim 7 depends).

Applicants have added new claim 24 which depends upon claim 1 and recites that the B block comprises dienes, polydienes, and/or random copolymers of diene. Claim 7 has been amended to depend upon claim 24 instead of claim 4.

The term "may be" in claims 12 and 13 are said to render these claims unclear. Claims 12 and 13 have been amended to replace the term "may be" with the term --is--.

Claim 14 is said to be unclear since the claim recites that the proportion of modifier is "1 to 35% for 99 to 65% resin" while claim 1 is not limited to 1-35% impact modifier. According to the Office Action, it cannot be determined if claim 14 is necessarily limited to 1-35% impact modifier or if the 99-65% resin A is necessarily in this range only when and if the amount of impact modifier is 1-35%. Claim 15 is said to contain a similar defect.

By this Amendment, claim 14 has been amended to recite that the material of claim 1 comprises from 1 to 35% of the impact modifier and from 99 to 65% of resin (A). Similarly, claim 15 has been amended to recite that the material comprises from 4 to 25% of the impact modifier and from 96 to 75% of resin (A).

Claim 19 is said to be unclear in that it recites "star-shaped triblocks S-B-S" even though S-B-S is not a star-shaped triblock. In addition, the Office Action states that it is not clear if the S-B-S block copolymers recited in claim 19 are meant to be different than

the S-B-M block copolymers of claim 1. In the specification at page 8, lines 20-22, Applicants explain, relative to the triblock S-B-S, that:

[t]he term "triblock" is not in agreement with the number of blocks but the term "star-shaped triblocks S-B-S" is clear for persons skilled in the art.

The specification then provides a structural formula as an example of an S-B-S triblock. Applicants respectfully submit that one skilled in the art would understand from the instant specification what is meant by the recitation "star-shaped triblocks S-B-S" in claim 19.

In view of the claim amendments and remarks made herein, Applicants respectfully request withdrawal of the § 112 rejection.

### **III. Rejection of Claims 1-19 and 21-23**

Claims 1-19 and 21-23 are rejected under 35 U.S.C. § 102(b) as being anticipated by Gottschalk.

Applicants respectfully submit that claims 1-3, 5-16, 18-20 and 22-26 are not anticipated by Gottschalk.

According to the Office Action, Gottschalk:

discloses a blend of polyphenylene oxide (PPE) and SAN (embraced by applicants' aromatic vinyl resin) as well as other aromatic vinyl resins with a compatibilizer which is either or both of a polystyrene-polymethacrylate diblock copolymer or a polystyrene-hydrogenated polybutadiene-polymethyl methacrylate block copolymer.

Claim 1 has been amended to limit the aromatic vinyl resin to a polystyrene. Claims 2, 3, 5-16, 18-20, 22 and 23 depend directly or indirectly upon claim 1 and, therefore, include this limitation. Gottschalk teaches that the blend therein may contain, in addition to the polyphenylene oxide and the impact modifier, "various styrene copolymers" such as poly(styrene-co-acrylonitrile), poly[styrene-co-(methyl methacrylate)], poly[styrene-co-(acrylic acid)] and poly[styrene-co-(maleic anhydride)].  
Gottschalk does not teach that the blend may contain a polystyrene *polymer*, i.e., a polystyrene which is not part of a copolymer. Thus, for at least this reason, Applicants submit that claim 1 is not anticipated by and would not have been obvious over Gottschalk.

#### **IV. Rejection of Claims 1-23 Based on Mehler**

Claims 1-23 are rejected under § 102(b) as being anticipated by Mehler.

Applicants respectfully submit that claims 1-3, 5-16, 18-20 and 22-26 are not anticipated by Mehler.

Mehler does not teach or suggest blends of polyphenylene oxide with a polystyrene polymer. Rather, the reference only discloses blends of polyphenylene ether with poly(styrene-co-acrylonitrile) (SAN). Thus, for at least this reason, Applicants submit that Mehler does not anticipate instant claims 1-3, 5-16, 18-20 and 22-26.

#### **V. Rejection of Claims 1-23 Based on DE '445**

Claims 1-23 are rejected under § 102(b) as being anticipated by DE '445.

Applicants respectfully submit that claims 1-3, 5-16, 18-20 and 22-26 are not anticipated by DE '445.

DE '445 does not teach or suggest blends of polyphenylene oxide with a polystyrene polymer. Instead, DE '445 only teaches blends of polyphenylene ether with poly(styrene-co-acrylonitrile) (SAN). Thus, for at least this reason, Applicants submit that DE '445 does not anticipate instant claims 1-3, 5-16, 18-20 and 22-26.

#### **VI. Conclusion**

In view of the foregoing remarks and amendments, Applicants respectfully request that the objections and rejections set forth in the Office Action be withdrawn and that claims 1-3, 5-16, 18-20 and 22-26 be allowed.

Respectfully submitted,

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**MARKED-UP PREVIOUS VERSION OF AMENDED CLAIMS**

1. (Amended) Rigid material based on PPO and [an aromatic vinyl resin] a polystyrene polymer with improved impact strength comprising:

- 99 to 20% of a resin (A) consisting of a mixture of PPO and of [an aromatic vinyl resin] a polystyrene polymer, and
- 1 to 80% of an impact modifier comprising at least one block copolymer S-B-M in which:
  - each block is linked to the other by a covalent bond or an intermediate molecule linked to one of the blocks by a covalent bond and to the other block by another covalent bond,
  - M consists of MMA monomers optionally copolymerized with other monomers and comprises at least 50% by weight of methyl methacrylate (MMA),
  - B is incompatible with the resin (A) and with the M block and its glass transition temperature Tg is less than [the temperature for using the rigid material] 0°C,
  - S is incompatible with the B block and the M block and its Tg or its melting point m.p. is greater than the Tg of B,
  - S is compatible with the resin (A).

2. (Amended) Material according to Claim 1, wherein the M blocks [consist of] comprise at least 60% by mass of syndiotactic PMMA [at at least 60%].

5. (Amended) Material according to Claim [4] 1, wherein the Tg of the B blocks is less than -40°C.

6. (Amended) Material according to Claim [5] 24, wherein the B blocks consist essentially of 1,4-polybutadiene.

7. (Amended) Material according to Claim [4] 24, wherein the dienes of the B block are hydrogenated.

8. (Amended) Material according to Claim [4] 25, wherein the B block consists of poly(butyl acrylate).

12. (Amended) Material according to Claim 1, wherein the number-average molar mass of the block copolymer S-B-M [may be] is between 10,000 g/mol and 500,000 g/mol.

13. (Amended) Material according to Claim 12, wherein the number-average molar mass of the block copolymer S-B-M [may be] is between 20,000 g/mol and 200,000 g/mol.

14. (Amended) Material according to Claim 1, [wherein the proportion of impact modifier is 1 to 35% for 99 to 65% of resin (A) respectively] comprising from 1 to 35% of the impact modifier and from 99 to 65% of resin (A).

15. (Amended) Material according to Claim 14, [wherein the proportion of impact modifier is 4 to 25% for 96 to 75% of resin (A) respectively] comprising from 4 to 25% of the impact modifier and from 96 to 75% of resin (A).

16. (Amended) Material according to Claim 1, wherein the impact modifier further comprises [at least one block copolymer S-B-M and] at least one polymer selected from the diblock copolymers S-B.

18. (Amended) Material according to Claim [17] 16, wherein the diblock S-B has a number-average molar mass which is between 10,000 g/mol and 500,000 g/mol.

19. (Amended) Material according to Claim 1, wherein the impact modifier also comprises at least one triblock S-B-S selected from [the] linear triblocks S-B-S and [the] star-shaped triblocks S-B-S.

20. (Amended) Material according to Claim 1, wherein [all or] part of the triblock S-B-M is replaced with a pentablock M-B-S-B-M.

22. (Amended) Material according to Claim 1, wherein the PPO to [aromatic vinyl resin] polystyrene polymer weight ratio is between 1/9 and 9/1.

**CLEAN COPY OF AMENDED CLAIMS**

1. (Amended) Rigid material based on PPO and a polystyrene polymer with improved impact strength comprising:

- 99 to 20% of a resin (A) consisting of a mixture of PPO and of a polystyrene polymer, and
- 1 to 80% of an impact modifier comprising at least one block copolymer S-B-M in which:
  - each block is linked to the other by a covalent bond or an intermediate molecule linked to one of the blocks by a covalent bond and to the other block by another covalent bond,
  - M consists of MMA monomers optionally copolymerized with other monomers and comprises at least 50% by weight of methyl methacrylate (MMA),
  - B is incompatible with the resin (A) and with the M block and its glass transition temperature Tg is less than 0°C,
  - S is incompatible with the B block and the M block and its Tg or its melting point m.p. is greater than the Tg of B,
  - S is compatible with the resin (A).

2. (Amended) Material according to Claim 1, wherein the M blocks comprise at least 60% by mass of syndiotactic PMMA.

5. (Amended) Material according to Claim 1, wherein the Tg of the B blocks is less than -40°C.

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6. (Amended) Material according to Claim 24, wherein the B blocks consist essentially of 1,4-polybutadiene.

7. (Amended) Material according to Claim 24, wherein the dienes of the B block are hydrogenated.

8. (Amended) Material according to Claim 25, wherein the B block consists of poly(butyl acrylate)

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12. (Amended) Material according to Claim 1, wherein the number-average molar mass of the block copolymer S-B-M is between 10,000 g/mol and 500,000 g/mol.

13. (Amended) Material according to Claim 12, wherein the number-average molar mass of the block copolymer S-B-M is between 20,000 g/mol and 200,000 g/mol.

14. (Amended) Material according to Claim 1, comprising from 1 to 35% of the impact modifier and from 99 to 65% of resin (A).

15. (Amended) Material according to Claim 14, comprising from 4 to 25% of the impact modifier and from 96 to 75% of resin (A).

16. (Amended) Material according to Claim 1, wherein the impact modifier further comprises at least one polymer selected from the diblock copolymers S-B.

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18. (Amended) Material according to Claim 16, wherein the diblock S-B has a number-average molar mass which is between 10,000 g/mol and 500,000 g/mol.

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19. (Amended) Material according to Claim 1, wherein the impact modifier also comprises at least one triblock S-B-S selected from linear triblocks S-B-S and star-shaped triblocks S-B-S.

20. (Amended) Material according to Claim 1, wherein part of the triblock S-B-M is replaced with a pentablock M-B-S-B-M.

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22. (Amended) Material according to Claim 1, wherein the PPO to polystyrene polymer weight ratio is between 1/9 and 9/1.

NEW CLAIMS

--24. Material according to Claim 1, wherein the B block comprises dienes, polydienes and/or random copolymers of diene.--

--25. Material according to Claim 1, wherein the B block comprises an alkyl (meth)acrylate.--

--26. Rigid material based on PPO and an aromatic vinyl resin with improved impact strength comprising:

- 99 to 20% of a resin (A) consisting of a mixture of PPO and of an aromatic vinyl resin, and
- 1 to 80% of an impact modifier comprising:
  - (i) at least one block copolymer S-B-M in which:
    - each block is linked to the other by a covalent bond or an intermediate molecule linked to one of the blocks by a covalent bond and to the other block by another covalent bond,
    - M consists of MMA monomers optionally copolymerized with other monomers and comprises at least 50% by weight of methyl methacrylate (MMA),
    - B is incompatible with the resin (A) and with the M block and its glass transition temperature Tg is less than 0°C,
    - S is incompatible with the B block and the M block and its Tg or its melting point m.p. is greater than the Tg of B,
    - S is compatible with the resin (A); and
  - a pentablock M-B-S-B-M. --